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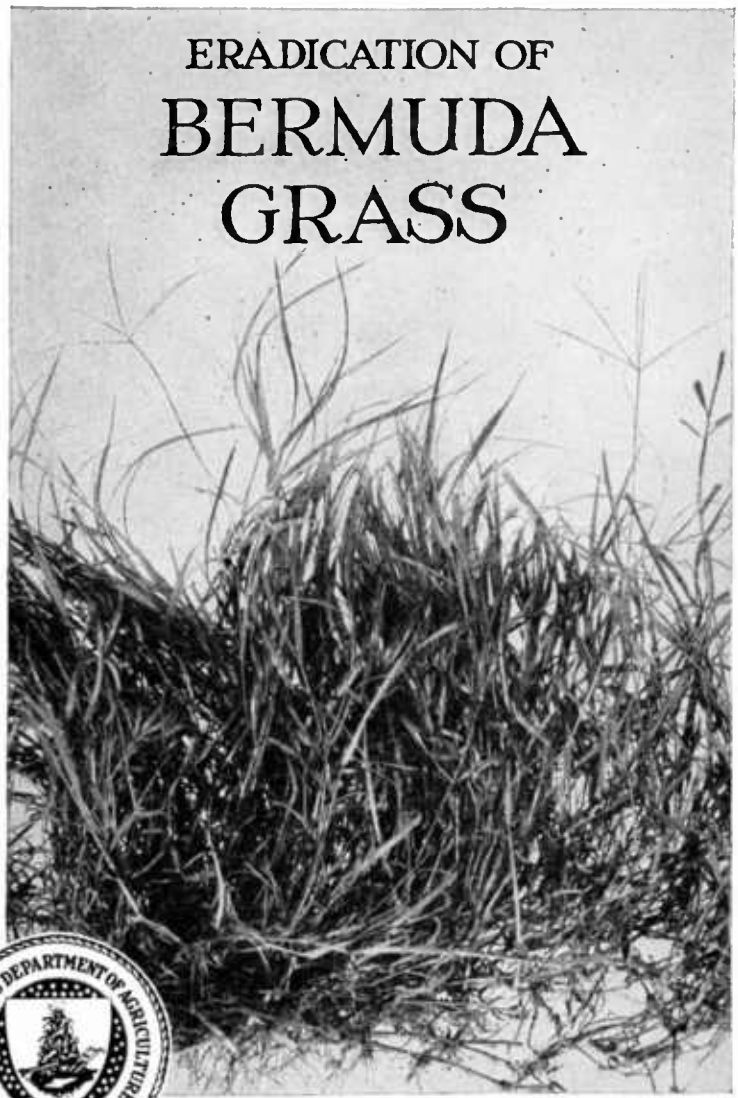
ERADICATION OF BERMUDA GRASS



BERMUDA GRASS is one of the most valuable grasses and at the same time one of the most pernicious weeds in the Southern States.

It is perennial by means of the surface-creeping stems which enable it to spread rapidly during the growing season and to form excellent pastures and lawns.

The same characters which make it so valuable also render it one of the principal weeds whose eradication is essential to the successful growing of intertilled crops. This can be best accomplished by taking advantage of the natural weaknesses of the plant, which are (1) inability to withstand shade and (2) susceptibility of the rootstock to winter-killing.

The most widely practiced and successful control method, especially in the Southwestern States, is a combined attack upon these two weak points by alternating summer shade crops, such as velvet beans and cowpeas, with intertilled crops, such as corn and cotton, keeping the soil occupied with growing oats or rye, with or without vetch, during the winter.

Hogs also are useful in eradicating Bermuda grass. They are fond of the rootstocks, and they will be aided greatly in the good work if the land is first plowed. A good system is to graze the land an entire season, continue the grazing the following season until midsummer, then plow shallow to expose the rootstocks to the drying action of the sun and the persistent rooting of the hogs.

Bermuda grass may be winterkilled by exposing the rootstock system to freezing, but this method is effective only in the northern part of the Bermuda-grass area, as killing frosts do not ordinarily occur in the central and southern parts.

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ERADICATION OF BERMUDA GRASS.

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IMPORTANCE OF BERMUDA GRASS.

BERMUDA GRASS is one of the most valuable as well as most troublesome grasses of our Southern States. This apparently contradictory statement is readily understood when it is known that Bermuda grass is one of the most highly valued pasture and lawn plants in the South. The vigor and tenacity of the grass, which render it so valuable for forage and lawn purposes, likewise make it pestiferous when invading places where it is not desired, especially in such cultivated crops as cotton, tobacco, corn, and vegetables. Bermuda grass was at one time looked upon solely as a pest, but in view of the fact that it is exceedingly valuable for pasture, hay, and lawn purposes, the plant has been widely utilized throughout the cotton belt and its value is far in excess of the damage which it causes.

NAMES BY WHICH THE GRASS IS KNOWN.

Bermuda grass[1] is also known as "wire-grass," "reed-grass," "dog's-tooth grass," "salt-grass" (the common name in California), "scutch-grass," "cane-grass," "Bahama grass," "Yankee grass" (a local name in Virginia, because of its supposed introduction by the northern army during the Civil War), and "devil grass."

INTRODUCTION INTO THE UNITED STATES.

Bermuda grass is a native of the Bengal region of India. The time and manner in which it was introduced into the United States

[1] *Capriola dactylon*, also known as *Cynodon dactylon*.

do not appear to be definitely known, but it was probably during the latter part of the eighteenth century. James Mease, in his Geological Account of the United States, published in 1807, states that "probably as important a grass as any for the Southern States is Bermuda grass, which grows with great luxuriance and propagates with astonishing rapidity by means of its numerous joints, every one of which takes root."

The present distribution of Bermuda grass is shown on the accompanying map (fig. 1).

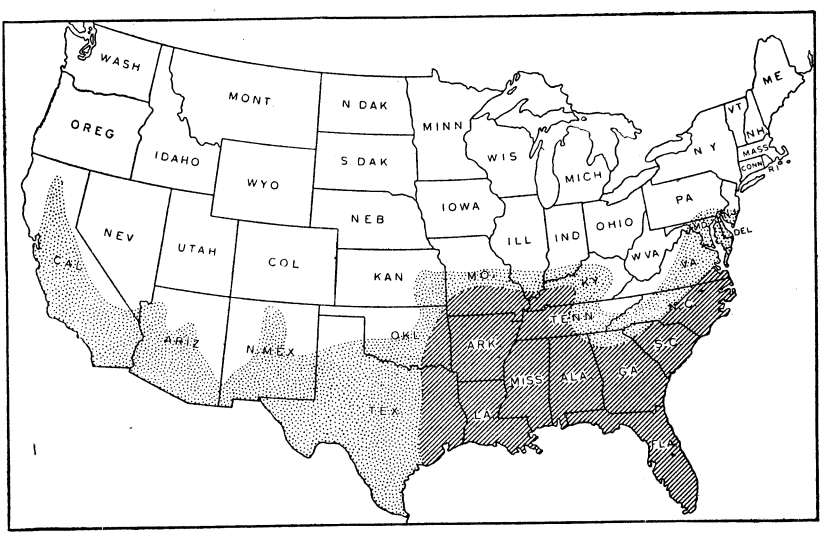

FIG. 1.—Present distribution of Bermuda grass in the United States, shown by shading. The heavily shaded area is the region in which the plant is most valuable.

IDENTIFICATION.

Bermuda grass is so well known that a detailed description is unnecessary. (See fig. 2.) Sometimes, however, the grass is confused with crabgrass,[1] goosegrass,[2] and false Bermuda grass.[3] It is distinguished from all these plants, however, by the ring of white hairs at the base of each leaf blade. Another conspicuous characteristic of the plant is the mass of creeping stems or runners which it produces. It is by no means exceptional to find runners many feet in length, usually forming a matted growth, well adapted to withstand grazing and trampling. The combination of the creeping stems above the ground and of rootstocks immediately below the surface makes Bermuda grass pernicious when growing where it is not desired. From the creeping stems upright

[1] *Syntherisma sanguinalis.* [2] *Eleusine indica.* [3] *Paspalum distichum.*

branches arise at intervals to a height of 6 to 12 inches, and sometimes more. Each flowering branch is crowned by a cluster of three to five slender ascending spikes arranged like the rays of an umbrella. The stems of the grass are compressed and consist of numerous joints, each of which, if separated, may grow readily into a new plant.

ADAPTATION TO SOIL.

Bermuda grass will grow on almost any type of soil, but it succeeds best on rich, heavy clays or clay loams. Upon such soils the

FIG. 2.—Plant of Bermuda grass.

plant is most noxious as a weed. It will make a moderate growth on clay soils which are too poor for the profitable production of most other crops. On sandy soils near the southern seacoast where the moisture is near the surface it is usually replaced by carpet grass.[1] Bermuda grass will tolerate more salt in the soil than probably any other of our common cultivated grasses. It is frequently found along seashores, where it proves resistant to the effects of salt-water spray. On the salt and alkaline soils of the Southwest it

[1] *Axonopus compressus.*

will grow where most grasses fail. Occasional submergence by water does not seriously affect the vitality of the plant.

VARIETIES.

Aside from the common form of Bermuda grass, two well-marked varieties exist, both of which lack the underground rootstocks. Giant Bermuda grass[1] is coarser and taller than the ordinary variety, while St. Lucie grass is smaller and finer. The absence of underground rootstocks makes these two varieties easy to eradicate, and both are less resistant to cold, so that they do not survive the winter north of Charleston, S. C., and Montgomery, Ala. St. Lucie grass is preferred by many for lawn purposes because the lack of rootstocks renders it comparatively harmless.

In addition to the varieties here described, there are many other minor variations or strains, from which very desirable forms of Bermuda grass may be selected. Farmers will do well to keep on the lookout for new varieties or strains; when once found such new forms can be propagated readily by means of cuttings.

VALUE OF BERMUDA GRASS.

In any consideration of a plant which is more useful than harmful, the value should first be recognized. Bermuda grass is useful for the following purposes:

As a sod plant.—Bermuda grass is the most valuable of southern lawn grasses, forming a smooth, dense turf. The first winter frost will kill back this grass, giving the lawn a brown, lifeless appearance and thereby revealing the most objectionable feature of a Bermuda-grass lawn, more especially so in the northern portion of its range. This condition may be remedied by sowing Italian rye-grass seed in the early fall at the rate of about 20 pounds per acre. This rye-grass will quickly cover the lawn with a green carpet, which usually does not disappear until the Bermuda grass has become dense early in the following summer. No other grass has as yet been found which will successfully replace Bermuda grass as a turf plant on moderately heavy and fertile soils in the sections of the South where Kentucky bluegrass or the bent grasses can not be advantageously grown. South of the Piedmont area the last two grasses can be grown only with special care. Bermuda grass is used extensively in making the sod of golf courses and grass tennis courts.

As a pasture plant.—Bermuda grass is the leading permanent pasture plant of the South; for this purpose it is used either alone or mixed with lespedeza. By the addition of black medic or bur clover the pasture may be grazed throughout the year. When used for

[1] Technically termed *Capriola dactylon maritima,* also known as *Cynodon dactylon maritimus.*

pasturing, the land must be plowed or disked every few years because of the tendency to become sod bound. The underground parts are greatly relished by hogs.

As a hay crop.—In a limited part of its range and upon rich soils only, Bermuda grass is used for hay purposes, especially on bottom land where a sufficient height is attained by the plant. As a hay crop the grass should be cut early, since overripe Bermuda hay is of inferior quality. Normally two crops are produced in a season.

Soil binding.—Wherever soil erosion is a problem Bermuda grass is found useful to bind and catch the soil. Many southern levees are kept intact by means of a carpet of this grass. Shifting sands may also be arrested by its use, and sloping fields may be saved from erosion by well-set stands.

A very important use of Bermuda grass is to assist in the filling of gullies. Its creeping habit enables the plant to cover the soil; once established, the grass holds with great tenacity. The creeping stems, furthermore, are well adapted to holding particles of earth washed by rains. As the gully is thus built up, the Bermuda grass rises with the added soil. The dense mat of grass permits little loss of soil during this process.

Seed production.—Bermuda grass normally produces an abundance of viable seed in but a small part of its range. In the seed-producing areas, however, a source of considerable profit is thus opened. Prolific seed production is common in New Mexico, southern California, and Arizona; in these States seed raising is a profitable industry. American-raised seed is superior to the variety imported from Australia, which was formerly the main source of supply. The plant probably matures seed throughout its entire range, but the quantity of perfect seed normally formed is very small except in semiarid regions. For more humid States viable seed has been definitely recorded from Pennsylvania, the District of Columbia, North Carolina, Mississippi, Louisiana, and Texas.[1]

BERMUDA GRASS AS A WEED.

Although in many respects one of the most valuable forage plants of the South, Bermuda grass often causes much trouble as a weed. The greatest damage inflicted by this weed is in such cultivated crops as cotton, corn, tobacco, and vegetables. It is said that before the true value of the grass was appreciated many infested plantations and farms were abandoned because of its presence.

Where not desired in lawns Bermuda grass is objectionable, especially in regions favorable to the growth of bluegrass. On bluegrass

[1] Propagation methods, cultural directions, and other information are presented in Farmers' Bulletin 814, "Bermuda Grass," by Samuel M. Tracy.

lawns patches of Bermuda grass become brown when cold weather arrives, thus marring the beauty of the sward. Furthermore, the invasion of gardens by the grass necessitates much labor in order to clear the land of the undesired plants.

MEANS OF DISSEMINATION.

One of the most important features in the control of any noxious weed is to prevent its introduction into noninfested areas. The methods of dissemination have much to do with rendering a plant troublesome, since a weed easily distributed will again readily invade an area from which it has been cleaned out. Bermuda grass may be distributed by various methods, as follows:

Seed.—Though not many viable seeds are matured in humid regions, enough are perfected to make them a noteworthy means of distribution. They may be disseminated in a variety of ways, the most important of which are probably in hay, by floating in streams, and by transportation in mud adhering to wagons and other agricultural implements, and on the feet of animals.

Creeping stems upon the surface of the ground.—By its creeping stems (see fig. 2) a single plant may cover considerable ground in the course of a season of growth. This type of distribution is entirely local.

Creeping rootstocks below the surface of the ground.—The creeping rootstocks of the grass are likewise important in causing local distribution.

Detached pieces of either the creeping stems or the rootstocks.—These may be distributed by becoming attached to plows, wagons, and other farm implements. In addition, pieces may become lodged between the hoofs of cloven-footed animals and thus transported from place to place. Furthermore, certain birds, of which the orchard oriole is an example, use Bermuda grass in the construction of their nests and in so doing aid in distributing the plant by scattering small pieces of the rootstocks.

METHODS OF ERADICATION OR CONTROL.

The best way to eradicate a plant is to take advantage of its natural weaknesses.

The most vulnerable characteristics of Bermuda grass are (1) that the rootstocks are unable to withstand exposure either to intense cold or to severe drying and (2) that the plant can not endure prolonged shading.

ERADICATION BY COMBINING SHADE AND INTERTILLED CROPS.

Bermuda grass does not thrive except in open places and can not resist the effect of prolonged shade. This makes it relatively easy

to bring the weed under control by smothering it with heavy-growing or shade crops alternating with intertilled crops.

Many of the rootstocks may be removed after shallow plowing by harrowing or raking. This process entails additional labor but assists materially in subduing the weed.

The summer shade crops best suited for the eradication of Bermuda grass are velvet beans and cowpeas, although any other shade-producing plants, such as soy beans, sorghum, and millet, may be used. On poor soils velvet beans are the most efficient. Shade crops should be heavily seeded. The following crop should be winter oats or rye, either with or without vetch. After the removal of the oat or rye crop an intertilled crop, usually corn or cotton, should be planted. When the intertilled crop is removed the Bermuda grass will have been eradicated, provided the tillage was thorough. If the weed has not been eradicated, the entire process may readily be repeated, since by so doing there is no loss of the use of the land. An additional advantage of this combination method is that no organic matter is lost to the land.

In case the land is in Bermuda-grass sod, it may be plowed either in the fall or in the spring. If plowed in the spring, plant the summer shade crop and continue as previously suggested. If the land is plowed in the fall, plant the winter crop, follow by a summer shade crop, then another winter crop, after which the land should be practically free of the weed and ready for the intertilled crop.

The success of the method combining shade and intertilled crops depends on having the crops follow each other in such close succession that there will be no intervals during which the Bermuda grass will have a chance to spread, as it will quickly reestablish itself under favorable conditions.

ERADICATION BY WINTERKILLING.

Bermuda grass can not withstand severe cold. This weakness may be counted on to secure its eradication in the northern limits of its range or in any locality where prolonged periods of cold are experienced. The thick, matted rootstocks should be plowed shallow in the fall, thereby exposing them to winter freezing. A single severe freeze will often almost completely destroy the grass in a field so treated.

In plowing, it should be remembered that the rootstocks are usually close to the surface, especially when the field has been grazed. In consequence, very shallow plowing is necessary. The depth of the furrow should not exceed 2 or 3 inches. (See the illustration on the title-page.) Plowing can most readily be accomplished by using the type of plow known as the "Scotch bottom," an implement designed for turning a furrow of sod completely over.

Another method of securing winterkilling is repeated disking, cross disking, and harrowing during the winter season. The winterkilling method conserves the organic matter contained in the weed growth.

ERADICATION BY COMBINING FALLOWING AND INTERTILLED CROPS.

A cultivated field seriously infested with Bermuda grass may sometimes have to be abandoned for a season as far as crops are concerned while control methods are being practiced. The following method is applicable only to regions that have dry summers, such as the semiarid regions of the Southwest, and should not be used in regions with moist summers.

The best results are obtained by fallowing if the following procedure is adopted: First, utilize the grass for an entire season either for hay or pasture. Toward the end of the season the wiry, tangled rootstocks will have formed a dense mat immediately below the surface, or, in other words, the field will have become sod bound. In this condition the grass is most readily destroyed. Continue grazing the following season until midsummer, then plow shallow with a sharp turning plow, cutting off the furrow slice clean and turning it completely over. Deep plowing is beneficial rather than harmful to the grass; hence, the furrow should not exceed 3 or 4 inches in depth. A great deal of the rootstock system can be removed by means of raking, and this may sometimes be practicable. The exposure of the rootstocks to the hot sun will destroy a great proportion of them. The land should then be disked during the remainder of the growing season at intervals frequent enough to keep in check any top growth of the grass. The drying influence of the sun, combined with the starvation caused by the prevention of green growth, will often result in a complete destruction of the Bermuda grass in a single season. This method is most effective during a dry period and may not be successful during a season of continuous rainfall. In the southwestern portion of the Bermuda-grass area a winter cover crop also will be found valuable in this connection.

The following season an intertilled crop, such as corn or cotton, may be profitably planted, so that the consequent cultivation may destroy any stray Bermuda-grass plants which have survived.

A modification of this plan is practiced successfully in California. The infested land is pastured closely during the spring and plowed very shallow in early summer or as soon as the ground has dried out. The land is then thoroughly disked, immediately after which the spring-tooth harrow is used in order to drag out the pieces of grass and bring them to the surface. This harrow is used every other week until fall, when the land is plowed deep and planted to a winter crop. An intertilled clean-up crop is grown the following

spring in order to destroy any Bermuda-grass plants which have survived.

ERADICATION BY GRAZING WITH HOGS.

On light sandy soils hogs are sometimes used to dig up the rootstocks, which they eat greedily. Plowing will greatly aid the animals to get the rootstocks. The hogs, of course, should not have their snouts ringed.

ERADICATION METHODS FOR SMALL AREAS.

On small areas the following method is effective: Plow shallow to a depth of about 3 inches during a midsummer period of dry weather, turning the matted rootstocks to the sun as much as practicable. They should remain exposed until the entire surface is well dried out, a process which will be aided greatly by stirring the mass of plowed-up rootstocks every few days with a spading fork, rake, or spring-tooth harrow.

When the mass is thoroughly dry it may be raked into piles and burned or else removed to waste places. This method is laborious and has the disadvantage of wasting the organic matter contained in the grass.

In such limited areas as gardens the rootstocks can be gathered up with a rake or fork and burned. Another method which has been successfully used for small patches is to cover the infested spots in summer with tarred or other heavy paper in such a manner that the light is entirely excluded. The edges of the paper should be overlapped and covered with soil and the entire area of the paper well weighted down with soil or stones. In about two months it will be found that the Bermuda grass is entirely killed.

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November 5, 1923.

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